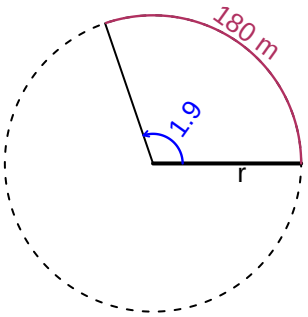
Name: Date:

Trig Final (SLTN v600)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 180 meters. The angle measure is 1.9 radians. How long is the radius in meters?

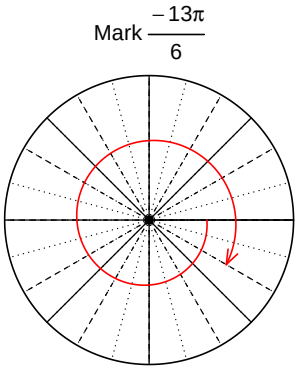


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

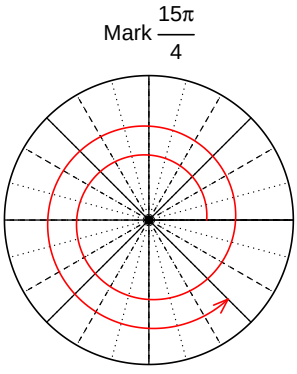
$r = 94.74$ meters.

Question 2

Consider angles $\frac{-13\pi}{6}$ and $\frac{15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-13\pi}{6}\right)$ and $\cos\left(\frac{15\pi}{4}\right)$ by using a unit circle (provided separately).



Find sin(−13π/6)



Find cos(15π/4)

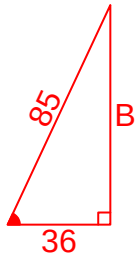
$\sin(-13\pi/6) = \frac{-1}{2}$

$\cos(15\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\cos(\theta) = \frac{-36}{85}$, and θ is in quadrant II, determine an exact value for $\tan(\theta)$.

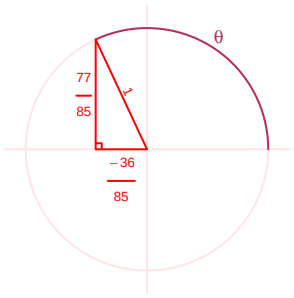
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$36^2 + B^2 = 85^2$$
$$B = \sqrt{85^2 - 36^2}$$
$$B = 77$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\tan(\theta) = \frac{\frac{77}{85}}{\frac{-36}{85}} = \frac{-77}{36}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 5.6 Hz, an amplitude of 4.53 meters, and a midline at $y = 7.89$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 4.53\sin(2\pi 5.6t) + 7.89$$

or

$$y = 4.53\sin(11.2\pi t) + 7.89$$

or

$$y = 4.53\sin(35.19t) + 7.89$$